Executive Registry

77-122

NPIC/D-378/70

2 1 DEC 1970

MEMORANDUM FOR: Executive Director-Comptroller

THROUGH: Chairman, Information Processing Board
DD/I Information Processing Coordinator

SUBJECT: Rental of Additional Core Memory for UNIVAC 494
Systems

REFERENCE: Memorandum from Ex. Dir.-Compt. dated 21 April 1970,
Subject: Approvals Concerning Acquisition of ADP
Equipment and Services

1. This proposal is for the rental of one additional core memory
module (of 65,536 words) for each of the two UNIVAC 494 systems presently
used by NPIC. The specific request is contained in paragraph 7.

2. The additional core is necessary to provide responses to actions
by users of the Integrated Information System (IIS), fast enough to avoid
any delay to the analysts that can be ascribed to "having to wait for the
computer." Since the IIS and its on-line users will function as an entity
in the image analysis process, delays occasioned by "waiting for the com-
puter" are, in fact, lost time that cannot be effectively applied to other
productive activities. The net effect of such delays, therefore, would be
to reduce the productivity of the imagery analysis operations in relation
to the potential productivity with a "wait-less" system.

3. A typical mix of IIS programs core-resident in the IIS computer
in prime shift during first phase exploitation would consist of 15 to 17
copies of some six different programs for a total core requirement of
110,000 to 130,000 words (see Attachment for a more detailed breakdown).
Since the Operating System requires about 55,000 words, the total core
requirement would range from about 165,000 to 185,000 words, well in
excess of the present 131,072 word memory. The consequences of this
imbalance will vary in a complex manner as a function of divers factors
such as the sequence in which the programs were requested by the users,
the particular inputs to the various programs, and the interaction

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between various user elements. The end result may range from a mere
delay of several minutes of initiating a verification review from a CRT
display to a wait of an hour or more for accomplishment of a complex
query against the data base. In both situations, there is a direct
effect on the production process and a possible indirect effect arising
from analyst dissatisfaction.

4. The need to increase the amount of core memory on both machines,
rather than just on one, arises from the use of the second central pro-
cessor as back up for the IIS system in addition to the prime functions
of on-line photo-measurement support to the photo interpreters and
photogrammetrists, execution of production programs initiated at remote
stations, and compilation of FORTRAN and COBOL programs. There is an
additional and independent, albeit subsidiary, justification for increas-
ing the amount of core available to this machine. Extension of the on-
line measurement system to handle stereo mensuration has almost doubled
its core requirement, leaving only 55,000 words of core to provide for
open-shop programming and remote batch operation in the Center. The
consequence is a marked increase in turn-around time and a severe limita-
tion on the size of programs that can be essayed by open-shop programmers.

5. There is only one alternative that offers a real possibility
of avoiding the delays inherent in the IIS under peak loading conditions
as previously described. Approximately half of the core requirement at
peak loading is taken up by copies of the so-called VEA program, on a
basis of one copy for each active CRT display station. An alternative
programming approach to support these CRT units would be the development
of a single program that can be used by all the CRTs that are on-line
at any given time. The time, effort, and complexity of developing a
re-entrant VEA program appeared to be a full order of magnitude greater
than for the route followed, which was the result of a design decision
made in the early stages of the IIS. In retrospect it is clear that we
should have followed the re-entrant approach. If we initiate such a
program development at this time as an alternative to increasing the
amount of available core it would probably take five man-years of effort
spread over an 18 month period. In our judgment the Center cannot afford
an 18 month overload situation with an on-line system like the IIS.

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6. Because of an anticipated increase in workload we propose to lease the first core module (for use on the "IIS machine") in the fourth quarter of FY 1971; and the second module (for use on the "photo-measurement machine") in the first quarter of FY 1972. Funds in the appropriate fiscal years would be available from NPIC's budget.

7. Request approval to negotiate a contract with [   ] for the lease of two 65,536-word core modules, one to be installed 1 March 1971 and the second to be installed 1 July 1971, at a cost of approximately [   ] per month per module, including mainte-nance.

ARTHUR C. LUNDAHL
Director
National Photographic Interpretation Center

Attachment:
Functions & Core Requirements
of Major IIS Program Elements

CONCUR: (Signed) [   ]   2 2 DEC 1970
         DD/I Information Processing Coordinator   Date

         [   ]   6 JAN 1971
         Chairman, Information Processing Board   Date

APPROVED: /s/ L. K. White   6 JAN 1971
          L. K. WHITE   Date
          Executive Director-Comptroller

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Distribution:
  Orig - NPIC/GUID (After Approval)
     1 - Ex. Dir.-Compt.
     1 - Ch/IPB
     1 - DDI/IPC
     2 - NPIC/CDIP
     1 - NPIC/PPBS
     1 - NPIC/PSG
     2 - NPIC/PSG/AID

25X1   (NPIC/PSG/AID[   ]gm/16 Dec 1970)

FUNCTIONS & CORE REQUIREMENTS
OF MAJOR IIS PROGRAM ELEMENTS

1. The core requirements of the function program subsystems (as
of 15 September 1970) and their descriptions are listed below. Following
this list are typical core for allocation peak and normal IIS computer
system activity.

    a. The Data Entry Program (DEN) allows the photo interpreter or
his representative to enter the target-oriented immediate reports
data into an "on-line" reports file. This program requires approxi-
mately 6,000 words of memory and is a remote batch type; i.e., the
program is loaded via a remote device but its input/output is handled
by the operating system as "batch" messages. The program is not
interactive but can be core-resident for long or short periods of
time depending upon the actual function(s) performed.

    b. The Verify, Edit and Approval Program (VEA) allows the mission
editors/coordinators to use a CRT to review and change information
entered via "DEN" above; verifying, editing and approving it for sub-
sequent publication and data base update. This program requires
approximately 7,000 words of memory and is a remote conversational
type, i.e., a "copy" of the program resides in memory for each CRT
"conversing" with the computer.

    c. The Extended File Control Subprogram (EFC) performs all
accesses to the sensitive drum based IIS files, preserving the file
integrity as well as simplifying file input/output for other IIS
application programs. This routine requires approximately 5,000
words of memory and is a non-resident re-entrant type of routine;
i.e., core-resident in one copy when needed, yet shared by all IIS
programs. It can be considered a subroutine common to all programs,
yet using only that core required for one program.

    d. The Automated Update Program (AUD) accepts "approved" target
data (after VEA process) and uses it to update appropriate targets
in the IDF. This program requires approximately 4,000 words of
memory and is scheduled automatically by "EFC" when there is data
base update action to perform.

FUNCTIONS & CORE REQUIREMENTS
OF MAJOR IIS PROGRAM ELEMENTS

e. The On-Line program (OLD) allows the data base coordinators
to recall data from the file on to a CRT, alter the data, and return
it to the data base (via AUD). This program requires approximately
3,500 words of memory and is a remote conversational type.

f. The Batch Query Language Program (BQL) allows IIS file users
to query the files in a manner that requires passing large portions
of data base, thus requiring processing times prohibitive to the
"on-line" language. This program requires approximately 15,500 words
of memory and is a remote batch or operator-initiated batch program.
Typically, this program (as well as RPG below) will be limited to
one or two copies in memory during prime time due to size, core
residency time, and volume of input/output activity.

g. The Report Generation Program (RPG) provides the generalized
capability for "hard copy" formatting of IIS outputs. This program
requires approximately 16,300 words of memory and is a remote batch
type. This program, typically, is called automatically by BQL to
format the data acquired from a selection process. Subsets of this
program exist within the OLD, VEA, and PIRL programs.

h. The PIC Retrieval Language Program (PIRL) allows IIS file
users to query the files using concise statements resulting in
limited amounts of highly useful data consisting of specific pieces
of file information. These data are usually displayed on a device
with limited display area. This program requires approximately
18,500 words of memory and is either remote conversational or remote
batch.

i. The Presentation Language Program (PLP) provides the capa-
bility to define new or altered report formats for use by the RPG
program. This program requires approximately 7,000 words of memory
and is a remote batch type.

j. The Periodic Update Program (PUD) manages the mass storage
for the IIS files. The program redistributes the data stored in file
overflow/add areas into a compact and efficient arrangement. The
program also purges outdated information from the files. This pro-
gram requires 32,000 words of memory and is a batch type.

FUNCTIONS & CORE REQUIREMENTS
OF MAJOR IIS PROGRAM ELEMENTS

2. Since the previous programs are loading and processing in conso-
nance with NPIC's workload and requirements, it is erroneous to simply
add the individual program core requirements to arrive at the total IIS
system core requirement. Typical "mixes" along with the resulting core
requirements are shown below.

a. Peak IIS Activity (during first-phase exploitation; approxi-
mately two weeks duration in conjunction with receipt of film).

	Program Name	Number, Simultaneously Core-Resident	Memory Requirements (K = thousands of words)
1.	VEA	8 (7K each)	56K
2.	FIRL	2 (18.5K each)	37K
3.	BOL/RPC (one or the other)	1	16K
4.	EPC	1	3K
5.	OLD/AUD (one or the other)	1	4K
6.	DEN	2 (6K each)	12K
		Total IIS Requirement	128K

b. Normal IIS Activity (typical working day with limited mission
exploitation but substantial data base maintenance, interrogation
and report generation).

FUNCTIONS & CORE REQUIREMENTS
OF MAJOR IIS PROGRAM ELEMENTS

	Program Name	Number, Simultaneously Core-Resident	Memory Requirements (K = thousands of words)
1.	VEA	3 (7K each)	21.0K
2.	EFC	1	3.0K
3.	BOL	1	15.5K
4.	RPG	1	16.3K
5.	AUD	1	4.0K
6.	OUD	3 (3.5K each)	10.5K
7.	PIRL	2 (18.5K each)	37.0K
8.	DEN	1	6.0K
		Total IIS Requirement	113.3K